

Pharmacology And Therapeutics



Horatio C. Wood

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PREFACE

The last two decades have witnessed extraordinary advances in all branches of medical science, but in none of them more striking than in Pharmacology. Twenty years ago this department of medical knowledge was a jumble of isolated facts; to-day it is an orderly science. Our knowledge of the changes produced by drugs in the bodily function has been enormously increased, but more important than this expansion in our information as to what drugs do, is the fact that we are beginning to understand how they do it, and thereby to be able to correlate the facts of drug action. The present conception of pharmacology is utterly different from that of a generation ago.

Owing partly to this epochal advancement in the science of pharmacology, and in part to the new ideas of teaching which have been introduced into the whole medical curriculum, there has been in the last ten years a revolution in the methods of teaching pharmacology. The old style of text-book of *materia medica* and therapeutics is so fundamentally at variance with modern ideas that it is almost impossible to make it conform to the needs of the present-day student. The author has had this conviction brought home with more and more force by each succeeding class of students for several years, and it is the feeling that there was need of a book which should present the concept of to-day in a form sufficiently concise and comprehensible to be available for the ordinary student which has led to the preparation of this work.

While convinced that the most successful therapeutics is impossible without an understanding of pharmacology, the author feels equally strongly that pharmacology is of no value to the medical student save as a basis for practical therapeutics, and the more clearly the student can be made to perceive the relation between pharmacological science and the clinical employment of drugs for the relief of human suffering, just so much more valuable will his pharmacology become to him and the more successful will be his future therapeutics. There is sometimes a tendency to-day to condemn the so-called practical branches of the medical course and to unduly exalt the scientific branches, just as a few years ago there was a very evident tendency in the opposite direction. The author believes that for the sake of impressing the student with the importance of a knowledge of the fundamental science, as well as to assist him in the associating of its facts, it is advisable that both scientific facts and their clinical application should each receive its due amount of attention in a book on therapeutics, and he has endeavored to subordinate neither the science nor its application in this present work, but to emphasize their mutual interdependence.

Science has been well defined as "An orderly collection of facts."

For us to be justified in denominating any collection of facts as a science, we must be able to show the connection of these facts to each other, and any effort at the correlation of facts must, of necessity, lead to some system of classification. We are to-day in a position to make a tentative classification of drugs on purely pharmacological grounds which, if not absolutely perfect, would be nearly enough so to be practicable. Such a classification, however, is likely to lead to the disparagement of the ultimate purpose of the science; namely, the increase in therapeutic accuracy. The chief disadvantage of an alphabetical arrangement, or any similar purely arbitrary order of consideration, is that it deprives the student of the aid which comes from the association of similar ideas, and, therefore, greatly increases his difficulty in acquiring knowledge of the subject; and any clinical classification of drugs, however useful it might be in a reference book for practitioners, which does violence to the natural pharmacological groupings of drugs, has the same objection of adding to the student's burden. The author has spent much thought in attempting to devise a classification which would emphasize both the pharmacological and clinical relations of drugs. While it is manifestly hopeless to attempt to reach a perfect harmony between these two systems, such an arrangement, whatever its theoretical objections, will prove the most useful practically.

Pharmacology includes the study of the physical and chemical properties of drugs, the changes produced in the normal functions by them, and their practical use in the treatment of disease. While a knowledge of certain facts concerning the physical properties of drugs is essential for a physician, it is evident that so detailed a knowledge of *materia medica* as would be required of a pharmacist, for example, is not necessary. The author has aimed to prepare a book which should cover the whole subject of pharmacology as far as is useful to the practitioner or student of medicine.

While *materia medica* is so different in the intellectual demands for its acquiring that it may often be separated from pharmacodynamics without injury to the systematic development of the course in pharmacology, the physical juxtaposition of the consideration of the physical and physiological properties and therapeutic uses of a drug adds so much to the value of the book as a work of reference, and, even where the subjects are taught separately, detracts so little from its utility to the student, that a division seems inadvisable. If for any reason it is deemed wiser to give instruction in *materia medica* and in pharmacodynamics at different periods in the curriculum, the book can be used in both years, as the treatment of *materia medica* and of physiological action has been kept entirely distinct.

While the order in which the drugs are taken up is that which the author himself employs, it is not necessary to follow it absolutely, for the book is so arranged that each chapter is independent, and there is no added difficulty for the student, in whatever order the chapters are taken up, provided each chapter is considered as a whole.

ABBREVIATIONS

- A. A.**—Archiv für Augenheilkunde.
A. A. P.—Archiv für Anatomie und Physiologie.
A. C. J.—American Chemical Journal.
A. de P.—Archives de Physiologie normale et pathologique.
A. E. P. P.—Archiv für experimentelle Pathologie und Pharmacologie.
A. G. M.—Archives générales de Médecine.
A. G. P.—Archiv für die gesammte Physiologie des Menschen und der Thiere.
A. Hk.—Archiv der Heilkunde.
A. I. B.—Archives italiennes de Biologie.
A. I. Past.—Annales de l'Institut Pasteur.
A. I. P.—Archives internationales de Pharmacodynamie.
A. J. M. S.—American Journal of the Medical Sciences.
A. J. P.—American Journal of Physiology.
A. K. C.—Archiv für klinische Chirurgie.
A. M. Ex.—Archives de Médecine expérimentelle et d'Anatomie pathologique.
Amer. Med.—American Medicine.
A. N.—Alienist and Neurologist.
An. d'H.—Annales d'Hygiène.
An. O.—Annals of Ophthalmology.
A. Ph.—Archiv für Anatomie und Physiologie, physiologisches Abtheilung.
A. Phar.—Archives de Pharmacodynamie.
Arch. Hyg.—Archiv für Hygiene.
A. R.—Aerztliche Rundschau.
Aus. M. Gaz.—Australian Medical Gazette.
Aus. M. J.—Australian Medical Journal.
A. V. K.—Archiv für Verdauungs-Krankheiten.
A. Z.—Apotheker-Zeitung.
B. A. M.—Bulletin de l'Académie de Médecine de Paris.
B. A. R. B.—Bulletin de l'Académie Royale de Médecine de Belge.
B. G. T.—Bulletin général de Thérapeutique médicale et chirurgicale.
B. K. Ch.—Beiträge zur klinischen Chirurgie.
B. K. W.—Berliner klinische Wochenschrift.
Bull. Med.—Le Bulletin Médicale.
B. M. J.—British Medical Journal.
B. M. S. C. P.—Bulletin et Mémoires de la Société Clinique de Paris.
B. M. S. H.—Bulletin Société Médicale des Hôpitaux des Paris.
B. M. S. J.—Boston Medical and Surgical Journal.
B. P. A.—Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie.
Cb. B.—Centralblatt für Bacteriologie.
Cb. C.—Centralblatt für Chirurgie.
Cb. I. M.—Centralblatt für Innere Medicin.
Cb. N.—Centralblatt für Nervenheilkunde.
Cb. P.—Centralblatt für Physiologie.
Cb. B. S. A.—Correspondenzblatt der Schweizerischen Aerzte.
Chi. M. J.—Chicago Medical Journal.
C. K. M.—Centralblatt für klinische Medicin.
C. M. R. V.—Contributions to Medical Research. Vaughn. Ann Arbor. 1903.
C. M. W.—Centralblatt für medicinischen Wissenschaften.
C. R. A. S.—Comptes-rendus de l'Académie de Science, Paris.
C. R. S. B.—Comptes-rendus de la société de Biologie, Paris.
D. A. K. M.—Deutsches Archiv für klinische Medicin.
D. J. M. S.—Dublin Journal of the Medical Sciences.
D. Kl.—Deutsche Klinik.
D. M. W.—Deutsche medicinische Wochenschrift.
D. Z. Ch.—Deutsche Zeitschrift für Chirurgie.
Ed. M. J.—Edinburgh Medical Journal.
Fort. M.—Fortschritte der Medicin.
G. A. M. T.—Giornale della Reale Accademia di Medicina di Torino.
G. H. M. C.—Gazette Hebdomadaire de Médecine et de Chirurgie.

- G. K. H.**—Monatsberichte über die gesammte Leistungen auf dem Gebiete der Krankheiten des Harn und Sexual-Apparates.
G. M. P.—Gazette Médicale de Paris.
Gl. M. J.—Glasgow Medical Journal.
Guy H. R.—Guy's Hospital Reports.
Hk.—Die Heilkunde.
H. S. Jb.—Hoffmann and Schwalbe's Jahresberichte über die Fortschritte der Anatomie und Physiologie.
I. B. I. M.—Internationale Beiträge zur Inneren Medicin.
In. Dis.—Inaugural Dissertation.
J. A. M. A.—Journal of the American Medical Association.
J. A. P.—Journal of Anatomy and Physiology.
J. Chem. S.—Journal of the Chemical Society of London.
J. de l'A. P.—Journal de l'Anatomie et Physiologie.
J. de Th.—Journal de Thérapeutique.
J. Ex. M.—Journal of Experimental Medicine.
J. M. R.—Journal of Medical Research.
J. N. M. D.—Journal of Nervous and Mental Diseases.
J. P.—Journal of Physiology.
J. P. and B.—Journal of Pathology and Bacteriology.
J. P. Ex. T.—Journal of Pharmacology and Experimental Therapeutics.
K. T. W.—Klinische-Therapeutische Wochenschrift.
L. L.—London Lancet.
Lyon M.—Lyon Médicale.
L. M. R.—London Medical Recorder.
M. A.—Merck's Archives.
M. C. C.—Medicinische-Chirurgisches Centralblatt.
M. C. Tr.—Medico-Chirurgical Transactions.
Med. R.—Medical Register.
M. H. H. B.—Marine Hospital Hygienic Laboratory Bulletin.
M. M. W.—Münchener medicinische Wochenschrift.
M. News.—Medical News.
M. N. A. S.—Memoirs of the National Academy of Science.
M. R.—Merck's Report.
M. S. Rep.—Medical and Surgical Reporter.
M. T. G.—Medical Times and Gazette.
M. W.—Medicinische Wochenschrift.
N. Cb.—Neurologisches Centralblatt.
N. O. M. J.—New Orleans Medical Journal.
N. Y. M. J.—New York Medical Journal.
N. Y. M. R.—New York Medical Record.
N. Y. M. T.—New York Medical Times.
O. M. R.—Ohio Medical Recorder.
O. R.—Ophthalmic Record.
Pa. M. S. J.—Pacific Medical and Surgical Journal.
Path. Intern.—Pathologie Interne.
Ph. Post.—Pharmaceutical Post.
P. J. and Tr.—Pharmaceutical Journal and Transactions.
P. M. C. P.—Pester medicinisch Chirurgische Presse.
P. M. J.—Philadelphia Medical Journal.
P. M. T.—Philadelphia Medical Times.
P. P. S. L.—Proceedings of the Physiological Society of London.
Pract.—Practitioner.
Press. M. B.—La Presse Médicale Belgique.
Pr. M. W.—Prager medicinische Wochenschrift.
Prog. M.—Le Progrès Médical.
P. Tr. R. S. L.—Philosophical Transactions of the Royal Society of London.
R. C.—Revue de Chirurgie.
R. M. S. R.—Revue Médicale de la Suisse Romande.
Rif. M.—La Riforma Medica.
R. T.—Revue de Thérapeutique.
Sb. G. W.—Sitzungsberichte der königliche Gesellschaft der Wissenschaften.
S. Jb.—Schmidt's Jahrbücher der in- und ausländischen gesammten Medicin.
S. M.—La Semaine Médicale.
St. L. C. R.—St. Louis Clinical Record.
St. L. M. S. J.—St. Louis Medical and Surgical Journal.
S. L. P. Y. C.—Studies from the laboratory of Physiological Chemistry of Yale University.
St. P. M. W.—St. Petersburg medicinische Wochenschrift.
T. G.—Therapeutic Gazette.
Ther. Geg.—Die Therapie der Gegenwart.
Th. M.—Therapeutische Monatshefte.
Tr. A. O. S.—Transactions of the American Ophthalmological Society.
Tr. I. C. C.—Transactions of the International Congress of Charity, Corrections, and Philanthropy.

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| <p>Tr. P. C. M. S.—Transactions of the Philadelphia County Medical Society.</p> <p>Tr. R. S. Ed.—Transactions of the Society of Edinburgh.</p> <p>T. W.—Therapeutische Wochenschrift.</p> <p>U. M. M.—University Medical Magazine.</p> <p>U. N. M. T.—Untersuchungen zur Naturlehre des Menschen und der Thiere. Moleschott.</p> <p>U. P. L. W.—Untersuchungen aus den Physiologisches Laboratorium zu Würzburg.</p> <p>U. P. M. B.—University of Pennsylvania Medical Bulletin.</p> <p>U. S. P.—United States Pharmacopœia.</p> <p>V. A. P. A.—Virchow's Archiv für pathologische Anatomie und Physiologie.</p> <p>V. C. M.—Verhandl. des Congresses für Innere Medizin.</p> | <p>W. A. W.—Sitzungsberichte der kaiserlichen Akademie der Wissenschaften zu Wien. Math. Naturwiss. Kl.</p> <p>W. G. H.—Wochenschrift für die gesammte Heilkunde.</p> <p>W. K. R.—Wiener klinische Rundschau.</p> <p>W. K. W.—Wiener klinische Wochenschrift.</p> <p>W. M. Bl.—Wiener medicinische Blätter.</p> <p>W. M. P.—Wiener medicinische Presse.</p> <p>Z. B.—Zeitschrift für Biologie.</p> <p>Z. C. P. P.—Zeitschrift (Beiträge) zur Chemischen Physiologie und Pathologie.</p> <p>Z. F. H. I.—Zeitschrift für Hygiene und Infektionskrankheiten.</p> <p>Z. K. M.—Zeitschrift für klinische Medicin.</p> <p>Z. P. C.—Zeitschrift für physiologische Chemie.</p> |
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PHARMACOLOGY AND THERAPEUTICS

CHAPTER I.

PRELIMINARY CONSIDERATIONS.

DEFINITIONS.

Therapeutics is that branch of the medical art which deals with the treatment of disease, including the use not only of chemical agencies (drugs), but also of various physical agencies and the regulation of the mode of living. The science which treats of drugs is called *pharmacology*. Pharmacology includes *materia medica*, the study of the physical properties of substances used as medicines; *pharmacy*, the science of preparing and combining drugs; and *pharmacodynamics*, the study of the effect of drugs upon the healthy animal organism (physiological action).

In nearly every civilized country there is some recognized list of drugs—setting forth standards for their purity and methods for manufacturing preparations from them—which is known as the *Pharmacopœia*. The United States Pharmacopœia is published by a convention which meets decennially, and is a standard by enactment of the National as well as most of the State legislatures.

Drugs are derived from the animal, mineral, and vegetable kingdom; the greater number of them, however, are of vegetable origin. Vegetable drugs, as a rule, contain some definite chemical substance to which they owe their remedial properties, and which is, therefore, known as the "active principle."

A number of these active principles belong to the class of substances known as alkaloids. An *alkaloid* may be defined as a nitrogenous substance of vegetable origin which is capable of playing the part of an alkali in so far that it forms salts with the acids. As a rule, alkaloids themselves are not freely soluble in water, but the salts which they form are very frequently so; therefore, with one or two exceptions, the alkaloids are usually employed in the form of some salt. Examples: morphine, strychnine, etc.

A *glucoside* is a proximate principle of vegetable origin which can be broken up by mineral acids into a sugar and another radical. Examples: strophanthin, salicin, etc.

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A number of these active principles belong to the class of substances known as alkaloids. An *alkaloid* may be defined as a nitrogenous substance of vegetable origin which is capable of playing the part of an alkali in so far that it forms salts with the acids. As a rule, alkaloids themselves are not freely soluble in water, but the salts which they form are very frequently so; therefore, with one or two exceptions, the alkaloids are usually employed in the form of some salt. Examples: morphine, strychnine, etc.

A *glucoside* is a proximate principle of vegetable origin which can be broken up by mineral acids into a sugar and another radical. Examples: strophanthin, salicin, etc.

Resins are complex bodies uncrystallizable and usually insoluble in water, but freely soluble in alcohol, ether, and chloroform. Strictly speaking, they are not chemical individuals, but more or less intimate mixtures of various substances; many of them have acid properties. Allied to the resins are the so-called oleoresins, which are mixtures of a resin with a volatile oil.

The *volatile oils* represent the active principles especially of many aromatic plants. They have a strong odor, are very slightly soluble in water, but usually soluble in alcohol or ether. They differ from the fixed oils in their greater aroma, but especially in the fact that when evaporated they leave behind no residue, and that they are not saponified by the alkalies. Examples: oil of wintergreen, oil of peppermint, etc.

Many principles of indefinite character have been grouped together under the head of *neutral principles*. They are usually of bitter taste, but differ from alkaloids in that they do not form salts with the acids. Various organic acids may also be the active principles of drugs.

Remedial agents of organic origin usually require more or less pharmaceutical manipulation before they are suited for medical uses. The preparations which are made from drugs are commonly known as *galenicals*, from Galen, the famous Roman physician who lived in the second century. The most important of the official galenicals are as follows:

Preparations Made with a Watery Vehicle.

Decocta.—Decoctions are made by boiling crude drugs for a greater or less time in water.

Infusa.—Infusions are made with water, either hot or cold, without boiling. They are prepared by maceration or by displacement.

Liquores.—Solutions are preparations in which a non-volatile principle is dissolved in water.

Aquæ.—Waters are solutions of volatile principles in water.

Mistura.—Mixtures are preparations in which one or more medicinal substances are held in suspension in water. Of such nature are *emulsi* (emulsions), in which some oily material is suspended by a gummy or an albuminous body.

Mucilagines.—Mucilages are solutions of gummy substances in water.

Syrupi.—Syrups are sugary liquids, the menstruum or basis of which is water, with in some cases vinegar or alcohol.

Liquid Preparations Made with an Alcoholic Vehicle.

Fluidextracta.—Fluidextracts are fluid preparations so made that one minim represents one grain of the crude drug.

Tinctura.—Tinctures are alcoholic solutions prepared by maceration, or displacement, from the crude drug, or by dissolving non-

volatile principles. In some of them strong, in others dilute, alcohol is used.

Spiritus.—Spirits are alcoholic solutions of volatile principles, made by direct solution or by distillation from the crude drug.

Vina.—Wines are preparations whose menstruum is wine.

Solid Preparations.

Extracta.—Extracts are solid preparations made in various ways from the crude drug. They are of a consistency suitable for the preparation of pills.

Confectiones.—Confections are medicinal substances beaten up with sugar into a pasty mass.

Trochisci.—Troches, or lozenges, are gummy pellets or disks, so made as to dissolve slowly in the mouth.

Suppositoria.—Suppositories are conical bodies, prepared for introduction into the rectum, where they melt from the heat of the body. Their basis is generally cacao butter or glycerinated gelatin.

Pilula.—Pills are small globular masses intended to be swallowed whole.

Unguenta and Cerata.—Ointments and cerates are solid or semi-solid fatty preparations for internal use. The cerates, containing wax (cera), are the firmer of the two preparations.

WEIGHTS AND MEASURES.

In ordering drugs we may make use of either the apothecaries'—the so-called English system—of weights and measures or the metric, or French, system. The metric system is universally employed in all civilized lands, except among English-speaking peoples, and is the system officially recognized by the United States Pharmacopœia, but in this country it is rarely employed in actual prescribing. The system of apothecaries' weights and measures used in the United States is as follows:

APOTHECARIES' WEIGHT—APOTHECARIES' MEASURE.

(Formerly Official in the United States Pharmacopœia.)

Pound.....℔ = 12 Ounces.	Gallon.....C = 8 Pints.
Ounce.....℥ = 8 Drachms.	Pint.....O = 16 Fluidounces.
Drachm.....ʒ = 3 Scruples.	Fluidounce.....f℥ = 8 Fluidrachms.
Scruple.....ʒ = 20 Grains.	Fluidrachm....fʒ = 60 Minims.
Grain.....gr. = 1 Grain.	Minim.....℥ = 1 Minim.

One of the disadvantages of the apothecaries' system of the weights and measures is the lack of unity between them. While for practical purposes we may regard a minim as a grain, it must be remembered that, speaking exactly, a minim of distilled water weighs but 0.947 grain, and the fluidounce containing 480 minims therefore weighs but 454.61 grains.

In the French or metric system, which has now been adopted throughout nearly the whole of Europe, there is an absolute relation not only between the weights and measures but also between these and the unit of length. In this system the unit of length is the *meter*, which is equivalent to 39.37 inches. The measure of volume is the *liter*, which is the amount which will be contained in a cubical vessel each of whose sides is 0.1 of a meter; in other words, the liter equals one cubic decimeter. It is equivalent to 2.113 pints. The unit of weight is known as a *gramme*, and is the weight of 0.001 liter of distilled water at a temperature of 4° C. Since one cubic centimeter is the same volume as one milliliter, it is evident that one cubic centimeter of water will weigh one gramme.

The whole metric system is based upon multiples of ten, for measures of weights and capacity as well as length. The following table gives the names of the various weights and measures in the French system. It should be remarked, however, that comparatively few of these names are in common use; weights between one gramme and one milligramme are always written as fractions of a gramme rather than a number of decigrammes or centigrammes; the term cubic centimeter (usually abbreviated to C.c.) is universally employed in this country instead of milliliter.

METRIC WEIGHTS.

One myriagramme	Mg.	=	10,000	grammes.
One kilogramme	Kg.	=	1,000	grammes.
One hectogramme	Hg.	=	100	grammes.
One dekagramme	Dg.	=	10	grammes.
One <i>gramme</i>	gm.	=	Weight of 1 cubic centimeter of water.	
One decigramme	dgm.	=	0.1	gramme.
One centigramme	cgm.	=	0.01	gramme.
One milligramme	mgm.	=	0.001	gramme.

METRIC MEASURES.

One myrialiter	Ml.	=	10,000	liters.
One kiloliter	Kl.	=	1,000	liters.
One hectoliter	Hl.	=	100	liters.
One decaliter	Dl.	=	10	liters.
One <i>liter</i>	l.	=	1 cubic decimeter or 1000 cubic centimeters.	
One deciliter	dl.	=	0.1	liter.
One centiliter	cl.	=	0.01	liter.
One milliliter.. (mil. or C.c.)	=	0.001	liter.	

Relation of Metric Weights to Apothecaries.—A gramme weighs 15.434 grains. For practical purposes of dosage, however, we may consider a gramme as weighing 15 grains. Two tables are appended, one of approximate relations between the French and English systems, suitable for calculating doses and which affords the basis for the doses used in this book, and one which represents the popular equivalents.

APPROXIMATE EQUIVALENTS OF APOTHECARIES' AND METRIC SYSTEMS.

Grains or minims		Grammes or C.c.
1/60 grain (or minim)	=	1 milligramme.
1 grain (or minim)	=	0.06 gramme (or C.c.)
5 grains (or minims)	=	0.3 gramme (or C.c.)
8 grains (or minims)	=	0.5 gramme (or C.c.)
15 grains (or minims)	=	1 gramme (or C.c.)
1 drachm (or fluidrachm)	=	4 grammes (or C.c.)
2½ drachms (or fluidrachms)	=	10 grammes (or C.c.)
1 ounce (or fluidounce)	=	30 grammes (or C.c.)

In prescribing medicine, we usually order it, for convenience, in household measures. Much might be said about the inexactness of this method, but as desirable as it would be to have our patients use accurate graduates, recourse to common household measures is often inevitable; but one point requires emphasis, as it is frequently overlooked by physicians, and that is that a minim is not a drop. Under certain conditions it is possible to drop distilled water so that each drop will measure one minim, but of alcoholic fluids the drop does not measure much over one-half a minim. Speaking generally of the vegetable tinctures, we may allow from 120 to 130 minims to the drachm.

The approximate equivalents of household measures are as follows:

2 drops	=	1 minim (of alcoholic preparations).
1 teaspoonful	=	1 fluidrachm = 4 C.c.*
1 dessertspoonful	=	2 drachms = 8 C.c.
1 tablespoonful	=	4 drachms = 15 C.c.
1 wineglassful	=	2 fluidounces = 60 C.c.
1 tumblerful	=	8 fluidounces = 250 C.c.

PRESCRIPTION WRITING.

A prescription is an order to an apothecary to dispense medicine. The fallacy of the idea which is prevalent, especially among students, that a prescription is not complete unless it includes a number of ingredients cannot be too strongly emphasized. A properly written order is a complete prescription, even if it calls for but one drug; in fact, the best prescription which can be written will contain but one substance, provided that one meets all the indications of the case.

Usually the prescription is written in the Latin language. The Latin language is preferable for the following reasons: (1) It is established by long custom; (2) it renders it more difficult for the patient to read the prescription; (3) it is the international language of science, and the prescription can be dispensed by a German- or Spanish-speaking apothecary as well as by an English-speaking one. In many

* The metric equivalents given above are those of the United States Pharmacopœia; according to the French Pharmacopœia a teaspoonful equals 5 C.c.